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1 AAAAAGAAAG GAAGAAAATG GAAATACAAC AAACACACCG CAAAATCAAT
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101 GCAACAAAGT CATGCCGCCT TTTTCACAAC CGTGATCATT CCAGCCATTG
151 TTGGGGGTAT CGCTACAGGC ACCGCTGTAG GAACGGTCTC AGGGCTTCTT
201 AGCTGGGGGC TCAAACAAGC CGAAGAAGCC AATAAAACCC CAGATAAACC
251 CGATAAAGTT TGGCGCATT C AAGCAGGAAA AGGCTTTAAT GAATTCCCTA
301 ACAAGGAATA CGACTTATAC AGATCCCTTT TATCCAGTAA GATTGATGGA
351 GGTGTTGGATT GGGGGAATGC CGCTAGGCAT TATTGGGTCA AAGGCGGGCA
401 ACAGAATAAG CTTGAAGTGG ATATGAAAGA CGCTGTAGGG ACTTATACCT
451 TATCAGGGCT TAGAACTTT ACTGGTGGGG ATTTAGATGT CAATATGCAA
501 AAAGCCACTT TACGCTTGGG CCAATTCAAT GGCAATTCTT TTACAAGCTA
551 TAAGGATAGT GCTGATCGCA CCACGAGAGT GATTTCAACG CTAAAAATAT
601 CTCAATTGAT AATTTTGCAG AAATCAACAA CTCGTGTGGG TTCTGGAGCC
651 GGGAGGAAAG CCAGCTCTAC GGTTTTGACT TTGCAAGCTT CAGAAGGGAT
701 CACTAGCGAT AAAACGCTG AAATTTCTCT TTATGATGGT GCCACGCTCA
751 ATTTGGCTTC AAGCAGCGTT AAATTAATGG GTAATGTGTG GATGGGCCGT
801 TTGCAATACG TGGGAGCGTA TTTGGCCCCT TCATACAGCA CGATAAACAC
851 TTCAAAAGTA ACAGGGGAAG TGAATTTTAA CCACCTCACT GTTGGCGATA
901 AAAACGCCGC TCAAGCGGGC ATTATCGCTA ATAAAAAGAC TAATATTGGC
951 AACTGGATT TGTGGCAAAG CGCCGGGTTA AACATTATCG CTCCTCCAGA
1001 AGGTGGCTAT AAGGATAAAC CCAATAATAC CCCTTCTCAA AGTGGTGCTA
1051 AAAACGACAA AAATGAAAGC GCTAAAAACG ACAAACAAGA GAGCAGTCAA
1101 AATAATAGTA AACTCAGGT CATTAACCCA CCCAATAGTG CGCAAAAAAC
1151 AGAAGTTCAA CCCACGCAAG TCATTGATGG GCCTTTTGCG GCGGCAAAG
1201 ACACGGTTGT CAATATCAAC CGCATCAACA CTAACGCTGA TGGCAGGATT
1251 AGAGTGGGAG GGTTTAAAGC TTCTCTTACC ACCAATGCGG CTCATTTGCA
1301 TATCGGCAAA GCGGGTGTCA ATCTGTCCAA TCAAGCGAGC GGGCGCTCTC

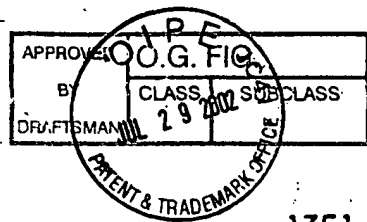
FIG. 1A

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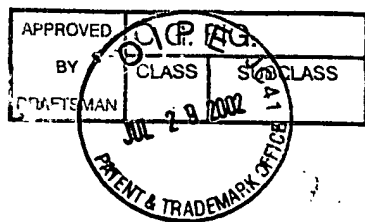
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1401 GTGAATAATC AAGTGGGTGG CTATGCTTTG GCAGGATCAA GCGCGAATTT
1451 TGAGTTTAAAG GCTGGTACGG ATACCAAAAA CGGCACAGCC ACTTTTAATA
1501 ACGATATTAG TCTGGGAAGA TTTGTGAATT TAAAGGTGGA TGCTCATACA
1551 GCTAATTTTA AAGGTATTGA TACGGGTAAT GGTGGTTTCA ACACCTTAGA
1601 TTTTAGTGGC GTTACAGACA AAGTCAATAT CAACAAGCTC ATTACGGCTT
1651 CCACTAATGT GGCCGTTAAA AACTTCAACA TTAATGAATT GATTGTAAAA
1701 ACCAATGGGA TAAGTGTGGG GGAATATACT CATTTTAGCG AAGATATAGG
1751 CAGTCAATCG CGCATCAATA CCGTGCGTTT GGAAACTGGC ACTAGGTCAC
1801 TTTTCTCTGG GGGTGTTAAA TTAAAGGTG GCGAAAAAT GGTTATAGAT
1851 GAGTTTTACT ATAGCCCTTG GAATTATTTT GACGCTAGAA ATATTAAAAA
1901 TGTGAAATC ACCAATAAAC TTGCTTTTGG ACCTCAAGGA AGTCCTTGGG
1951 GCACATCAAA ACTTATGTTC AATAATCTAA CCCTAGGTCA AAATGCGGTC
2001 ATGGATTATA GCCAATTTTT AAATTAAACC ATTCAAGGGG ATTTTCATCA
2051 CAATCAAGGC ACTATCAACT ATCTGGTCCG AGGTGGGAAA GTGGCAACCT
2101 TAAGCGTAGG CAATGCAGCA GCTATGATGT TTAATAATGA TATAGACAGC
2151 GCGACCGGAT TTTACAAACC GTCATCAAG ATTAACAGCG CTCAAGATCT
2201 CATTAAAAAT ACAGAACATG TTTTATTGAA AGCGAAAATC ATTGGTTATG
2251 GTAATGTTTC TACAGGTACC AATGGCATTG GTAATGTAA TCTAGAAGAG
2301 CAATTCAAAG AGCGCCTAGC CCTTTATAAC AACAATAACC GCATGGATAC
2351 TTGTGTGGTG CGAAATACTG ATGACATTAA AGCATGCGGT ATGGCTATCG
2401 GCGATCAAAG CATGGTGAAC AACCTGACA ATTACAAGTA TCTTATCGGT
2451 AAGGCATGGA AAAATATAGG GATCAGCAA ACAGCTAATG GCTCTAAAAT
2501 TTCGGTGTAT TATTTAGGCA ATTCTACGCC TACTGAGAAT GGTGGCAATA
2551 CCACAAATTT ACCCACAAC ACCACTAGCA ATGCACGTTT TGCCAACAAC
2601 GCCCTTGAC AAAACGCTCC TTTCGCTCAA CCTAGTGCTA CTCCTAATTT
2651 AGTCGCTATC AATCAGCATG ATTTTGGCAC TATTGAAAGC GTGTTTGAAT

FIG. 1B

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2701 TGGCTAACCG CTCTAAAGAT ATTGACACGC TTTATGCTAA CTCAGGCGCT
2751 CAAGGCAGGG ATCTCTTACA AACCTTATTG ATTGATAGCC ATGATGCGGG
2801 TTATGCCAGA AAAATGATTG ATGCTACAAG CGCTAATGAA ATCACCAAGC
2851 AATTGAATAC GGCCACTACC ACTTTAAACA ACATAGCCAG TTTAGAGCAT
2901 AAAACCAGCG GCTTACAAAC TTTGAGCTTG AGTAATGCGA TGATTTTAAA
2951 TTCTCGTTTA GTCAATCTCT CCAGGAGACA CACCAACCAT ATTGACTCGT
3001 TCGCCAAACG CTTACAAGCT TTAAAAGACC AAAAATTCGC TTCTTTAGAA
3051 AGCGCGGCAG AAGTGTTGTA TCAATTTGCC CCTAAATATG AAAAACCTAC
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3151 ACGCTTCATT GTATGGCACA AGCGCGGGCG TAGACGCTTA CCTTAACGGG
3201 CAAGTGGAAG CCATTGTGGG CGGTTTTGGA AGCTATGGTT ATAGCTCTTT
3251 TAATAATCGT GCGAACTCCC TTAActCTGG GGCCAATAAC ACTAATTTTG
3301 GCGTGTATAG CCGTATTTTA ACCAACCAGC ATGAATTTGA CTTTGAAGCT
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3401 ATTACAAGAT TTGAATCAAA GCTATCATT CTTAGCCTAT AGCGCTGCAA
3451 CAAGAGCGAG CTATGGTTAT GACTTCGCGT TTTTtagGAA CGCTTTAGTG
3501 TTAaaACCAA GCGTGGGTGT GAGCTATAAC CATTTAGGTT CAACCAACTT
3551 TAAAAGCAAC AGCACCAATC AAGTGGCTTT GAAAAATGGC TCTAGCAGTC
3601 AGCATTTATT CAACGCTAGC GCTAATGTGG AAGCGCGCTA TTATTATGGG
3651 GACACTTCAT ACTTCTACAT GAATGCTGGA GTTTTACAAG AGTTCGCTCA
3701 TGTTGGCTCT AATAACGCCG CGTCTTTAAA CACCTTTAAA GTGAATGCCG
3751 CTCGCAACCC TTAAATACC CATGCCAGAG TGATGATGGG TGGGGAATTA
3801 AAATTAGCTA AAGAAGTGTT TTTGAATTTG GCGTGTGTTT ATTTGCACAA
3851 TTTGATTTCC AATATAGGCC ATTTGCTTC CAATTTAGGA ATGAGGTATA
3901 GTTTCTAAAT ACCGCTCTTA AACCCATGCT CAAAGCATGG GTTTGAAATC
3951 TTACAAAACA

FIG. 1C

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Docket No. CHIR-0157

Serial No.: 09/360,685

Title: Helicobacter Pylori Cai Antigen Proteins Useful For Vaccines And
Diagnoses

Inventor(s): Covacci et al.

Sheet 4 of 14

Felicity E. Groth (215) 557-5908

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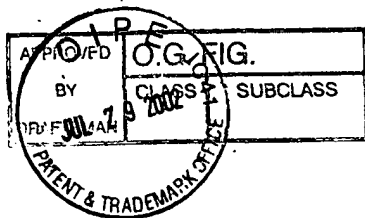
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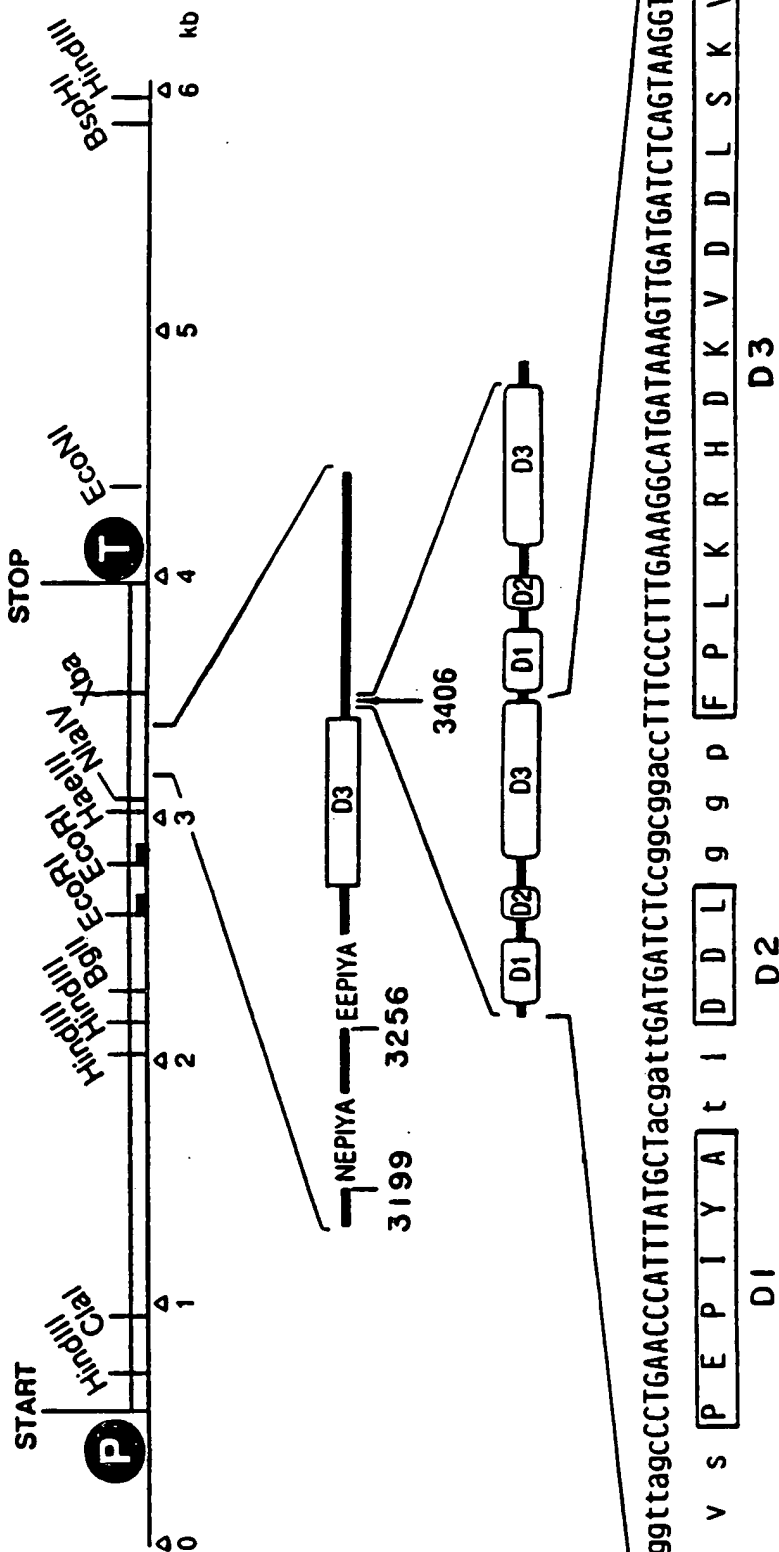
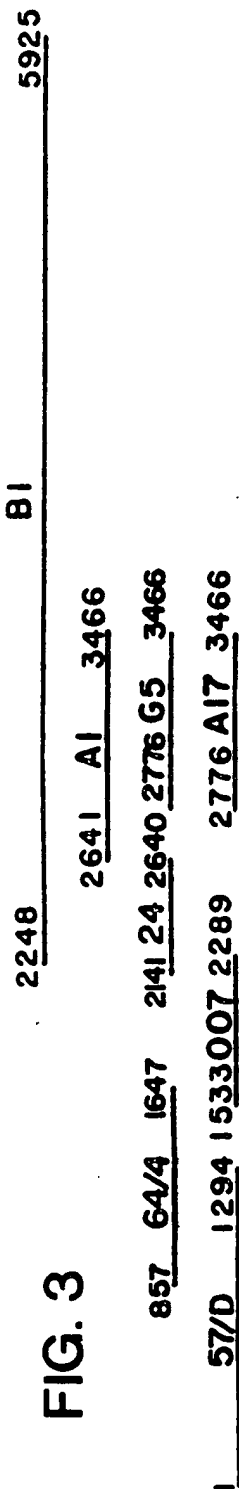
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51 GTAVGTVSGL LSWGLKQAE E ANKTPDKPDK VWRIQAGKGF NEFPNKEYDL
101 YRSLSSKID GGWDWGNAAR HYWVKGGQQN KLEVDMKDAV GTYTLSGLRN
151 FTGGDLVNM QKATLRLGQF NGNSFTSYKD SADRTTRVIS TLKISQLIIL
201 QKSTTRVGS G AGRKASSTVL TLQASEGITS DKNAEISLYD GATLNLASSS
251 VKLMGNVWVG RLQYVGAYLA PSYSTINTSK VTGEVNFNHL TVGDKNAAQA
301 GIIANKKTN I GTLDLWQSAG LNIIAPPEGG YKDKPNNTPS QSGAKNDKNE
351 SAKNDKQESS QNNSNTQVIN PPNSAQKTEV QPTQVIDGPF AGGKDTVVNI
401 NRINTNADGT IRVGGFKASL TTNAAHLHIG KGGVNLSNQA SGRSLIVENL
451 TGNITVDGPL RVNNQVGGYA LAGSSANFEF KAGTDTKNGT ATFNNDISLG
501 RFVNLKVDAH TANFKGIDTG NGGFNTLDFS GVTDKVNINK LITASTNAVAV
551 KNFNINELIV KTNGISVGEY THFSEDIGSQ SRINTVRLET GTRSLFSGGV
601 KFKGGEKLV I DEFYYSPPWNY FDARNIKNVE ITNKLAFGPQ GSPWGTSKLM
651 FNNLTLGQNA VMDYSQFLNL TIQGDFINNO GTINYLVRRG KVALTSVGNA
701 AAMMFNNDID SATGFYKPLI KINSAQDLIK NTEHVLLKAK IIGYGNVSTG
751 TNGISNVNLE EQFKERLALY NNNNRMDTCV VRNTDDIKAC GMAIGDQSMV
801 NNPDNYKYLI GKAWKNIGIS KTANGSKISV YYLGNSTPTE NGGNTTNLPT
851 NTTSNARSAN NALAQNAPFA QPSATPNLVA INQHDFGTIE SVFELANRSK
901 DIDTLYANS G AQGRDLLQTL LIDSHDAGYA RKMIDATSAN EITKQLNTAT
951 TTLNNIASLE HKTSGLQTLS LSNAMILNSR LVNLSRRHTN HIDSFAKRLQ
1001 ALKDQKFASL ESAAEVLYQF APKYEKPTNV WANAIGGTSL NNGSNASLYG
1051 TSAGVDAYLN GQVEAIVGGF GSYGYSSFNN RANSLNSGAN NTNFGVYSRI
1101 LTNQHEFD F AQGALGSDQS SLNFKSALLQ DLNQSYHYLA YSAATRASYG
1151 YDFAFFRNAL VLKPSVGVSY NHLGSTNFKS NSTNQVALKN GSSSQHLFNA
1201 SANVEARYYY GDTSYFYMNA GVLQEFHVG SNNAASLNTF KVNAARNPLN
1251 THARVMMGGE LKLAKEVFLN LGVVYLHNL I SNIGHFASNL GMRYSF

FIG. 2

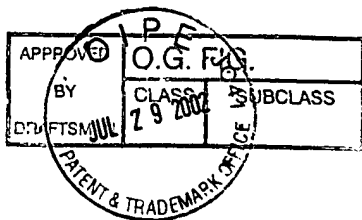
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Docket No. CHIR-0157

Serial No.: 09/360,685

Title: Helicobacter Pylori Cai Antigen Proteins Useful For Vaccines And
Diagnostics

Inventor(s): Covacci et al.

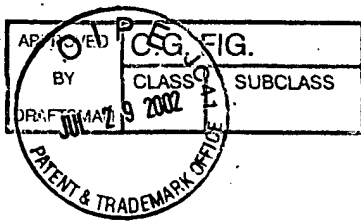
Sheet 6 of 14

Felicity E. Groth (215) 557-5908

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CTTTTTTCAATATTAATAATGATTAATGAAAAAAAAAAAAAATGCTTGATATTGTTGTAT
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M T
AATAATCTTCAAGTAGCTTTTTCTTAAAGTTGATAACGCTGTCGCTTCATACGATCCTGAT
23 N N L Q V A F L K V D N A V A S Y D P D
CAATTAAGGGAAGAATACTCCAATAAAGCGATCAAAAATCCTACCAAAAAGAATCAGTAT
63 Q L R E E Y S N K A I K N P T K K N Q Y
GAATCTTCCACAAAGAGCTTTCAGAAATTTGGGGATCAGCGTTACCGAATTTTCACAAGT
103 E S S T K S F Q K F G D Q R Y R I F T S
GAAAATATCATACAACCCCTATCCTTGATGATAAAGAGAAAGCGGAGTTTTTGAAATCT
143 E N I I Q P P I L D D K E K A E F L K S
ATGGGCGTGTTTGATGAGTCCTTGAAAGAAAGGCAAGAAGCAGAAAAAATGGAGAGCCT
183 M G V F D E S L K E R Q E A E K N G E P
GATGTCAAAGAAGCAATCAATCAAGAACCAGTTCCCATGTCCAACCAGATATAGCCACT
223 D V K E A I N Q E P V P H V Q P D I A T
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263 N F S K F T L G D M E M L D V E G V A D
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303 L M G S H N G I E P E K V S L L Y G G N
AACAATGTGGCTACAATAATTAATGTGCATATGAAAAACGGCAGTGGCTTAGTCATAGCA
343 N N V A T I I N V H M K N G S G L V I A
GGCTCACAACGAGCATTAAAGTCAAGAAGAGATCCAAAACAAAATAGATTTTCATGGAATTT
383 G S Q R A L S Q E E I Q N K I D F M E F
ACTGAGATTAAAGATTTCCAAAAAGACTCTAAGGCTTATTTAGACGCCCTAGGGAATGAT
423 T E I K D F Q K D S K A Y L D A L G N D
AATGGGGATTTGAGCTACACTCTCAAAGATTATGGGAAAAAAGCAGATAAAGCTTTAGAT
463 N G D L S Y T L K D Y G K K A D K A L D
TATTCTAATTTCAATACACCAACGCCTCCAAGAATCCCAATAAGGGTGTAGGCGTTACG

FIG. 4A



Docket No. CHIR-0157

Serial No.: 09/360,685

Title: Helicobacter Pylori: Cai Antigen Proteins Useful For Vaccines And
Diagnostics

Inventor(s): Covacci et al.

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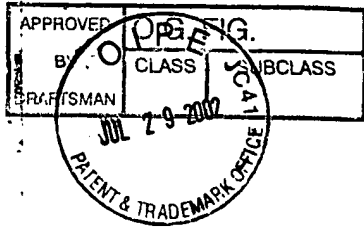
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AATGAGAATGTTCAAAGACATGAATTGACTACTCAAGCGTGTAGCGATTTTTAGCAGTCT 480
AACGAAACCATTGACCAACAACCACAACCGAAGCGGCTTTTAACCCGCAGCAATTTATC 600
N E T I D Q Q P Q T E A A F N P Q Q F I
CAAAAACCAATCGTTGATAAGAACGATAGGGATAACAGGCAAGCTTTTGAAGGAATCTCG 720
Q K P I V D K N D R D N R Q A F E G I S
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F S D F I N K S N D L I N K D N L I D V
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W V S H Q N D P S K I N T R S I R N F M
GCCAAACAATCTTTTGAGGAATCATTATAGGGAATCAAATCCGAACGGATCAAAAGTTC 1080
A K Q S F A G I I I G N Q I R T D Q K F
ACTGGTGGGGATTGGTTGGATATTTTCTCTCATTATATTTGACAAAAACAATCTTCT 1200
T G G D W L D I F L S F I F D K K Q S S
ACCACCACCGACATACAAGGCTTACCGCTGAAGCTAGAGATTTACTTGATGAAAGGGG 1320
T T T D I Q G L P P E A R D L L D E R G
ATTGATCCCAATTACAAGTTCAATCAATTATTGATTCACAATAACGCTCTGTCTTCTGTG 1440
I D P N Y K F N Q L L I H N N A L S S V
GGTGGTCCTGGAGCTAGGCATGATTGGAACGCCACCGTTGGTTATAAAGACCAACAAGGC 1560
G G P G A R H D W N A T V G Y K D Q Q G
GGTGGTGAGAAAGGGATTAACAACCTAGTTTTTATCTCTACAAAGAAGACCAACTCACA 1680
G G E K G I N N P S F Y L Y K E D Q L T
CTTGACAAAATAATGCTAAATTAGACAATTGAGCGAGAAAGAGAAGGAAAAATTCCGA 1800
L A Q N N A K L D N L S E K E K E K F R
CGTATTGCTTTTGTTCATAAAAAGACACAAAACATTCAGCTTTAATTACTGAGTTTGGT 1920
R I A F V S K K D T K H S A L I T E F G
AGGGAGAAAAATGTTACTCTTCAAGGTAGCCTAAAACATGATGGCGTGATGTTTGTGAT 2040
R E K N V T L Q G S L K H D G V M F V D
AATGGCGTTTCCATTTAGAAGTAGGCTTTAACAAGGTAGCTATCTTTAATTGCTGAT 2160

FIG. 4B

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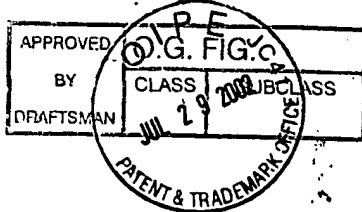
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543 L N N L A I T S F V R R N L C D K L T T
GAATTGGTTGGA AAAA ACTTTAACTTCAATAAAGCTGTAGCTGACGCTAAAAACACAGGC
583 E L V G K T L N F N K A V A D A K N T G
CATTTAGAGAAAGAAGTAGAGAAAAAATTGGAGAGCAAAAGCGGCAACAAAATAAAATG
623 H L E K E V E K K L E S K S G N K N K M
GCTAATAGAGACGCAAGAGCAATCGCTTACGCTCAGAATCTTAAAGGCATCAAAAGGGAA
663 A N R D A R A I A Y A Q N L K G I K R E
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703 E F K N G K N K D F S K A E E T L K A L
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743 N A A L N E F K N G K N K D F S K V T Q
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783 K V D N L N Q A V S V A K A T G D F S R
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903 Q A A S L E E P I Y A Q V A K K V N A K
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943 P L K R H D K V D D L S K V G L S R N Q
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983 F G N L E Q T I D K L K D S T K H N P M
TACGCTACTAACAGCCACATACGCATTAATAGCAATATCAAAAATGGAGCAATCAATGAA

FIG. 4C

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K G L S P Q E A N K L I K D F L S S N K
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N Y D E V K K A Q K D L E K S L R K R E
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L S D K L E N V N K N L K D F D K S F D
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K G S V K D L G I N P E W I S K V E N L
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A K S D L E N S V K D V I I N Q K V T D
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V E Q A L A D L K N F S K E Q L A Q Q A
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FIG. 4D

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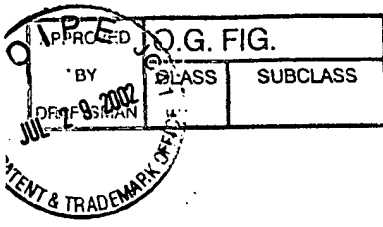
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 AGGCTTTTTTAAACGCTAAACCCTCCACACCGCTATCAAAAACGCCTATTTTCATG
 TCTTCATTGTCCTTAGTTTGTTGCATTTTAGAATAGACAAAGCTT 5925

FIG. 4E



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Diagnostics
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Felicity E. Groth (215) 557-5908

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S Y Y C L A R E N A E H G I K N V N T K G
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ACACTTTTTTAATTTAATGGGATTAATTAGGGATTTTATTTTTTCATTCATTAAGTTTAAAAAT 5880

FIG. 4F

APPROVED	Q.G. FIG.	
BY	CLASS	SUBCLASS
DRAFTSMAN		

Docket No. CHIR-0157
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 Inventor(s): Covacci et al.
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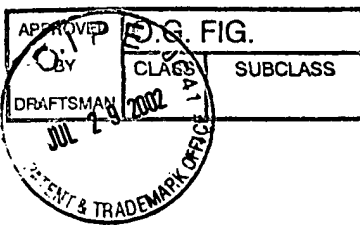
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A K E I K F S D S A R N L L F E G V R Q
      130             150             170
CTCCATGACGCTGTCAAAGTAACCATGGGGCCAAGAGGCAGGAATGTATTGATCCAAAAA
L H D A V K V T M G P R G R N V L I Q K
      190             210             230
AGCTATGGCGCTCCAAGCATCACCAAAGACGGCGTGAGCGTGGCTAAAGAGATTGAATTA
S Y G A P S I T K D G V S V A K E I E L
      250             270             290
AGTTGCCAGTAGCTAACATGGGGCGCTCAACTCGTTAAAGAAGTAGCGAGCAAACCGCT
S C P V A N M G A Q L V K E V A S K T A
      310             330             350
GATGCTGCCGGCGATGGCACGACCACAGCGACCGTGCTAGCTTATAGCATTTTTAAAGAA
D A A G D G T T T A T V L A Y S I F K E
      370             390             410
GGTTTGAGGAATATCACGGCTGGGGCTAACCTATTGAAGTGAAACGAGGCATGGATAAA
G L R N I T A G A N P I E V K R G M D K
      430             450             470
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E I T Q V A T I S A N S D H N I G K L I
      550             570             590
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A D A M E K V G K D G V I T V E E A K G
      610             630             650
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FIG. 5A



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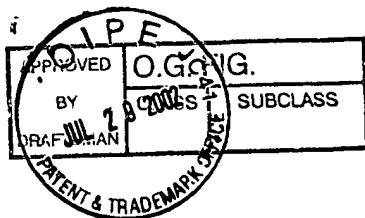
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T D K K I S S M K D I L P L L E K T M K
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D R R K E M L K D I A I L T G G Q V I S
970 990 1010
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E E L G L S L E N A E V E F L G K A G R
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I V I D K D N T T I V D G K G H S D D V
1090 1110 1130
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K D R V A Q I K T Q I A S T T S D Y D K
1150 1170 1190
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E K L Q E R L A K L S G G V A V I K V G
1210 1230 1250
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A A S E V E M K E K K D R V D D A L S A
1270 1290 1310
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T K A A V E E G I V I G G G A A L I R A

FIG. 5B



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R A I K A P L A Q I A I N A G Y D G G V		
1450	1470	1490
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Y V D M F K E G I I D P L K V E R I A L		
1570	1590	1610
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Q N A V S V S S L L L T T E A T V H E I		
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K E E K A T P A M P D M G G M G G M G G		
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FIG. 5C